

1 WHAT IS CLAIMED IS:

In an optical fiber communications system including a first node coupled to a second node by an optical fiber, a method for transmitting overhead information from the first node to the second node, the method comprising:

- generating a control channel containing the overhead information;
- frequency division multiplexing the control channel with a plurality of electrical low-speed channels to form an electrical high-speed channel;
- converting the electrical high-speed channel from electrical to optical form to form an optical high-speed channel; and
- transmitting the optical high-speed channel over the optical fiber to the second node.

2. The method of claim 1 wherein, within the optical high-speed channel, the control channel is more robust than the low-speed channels to impairments in the optical fiber.

3. The method of claim 1 wherein the control channel has a narrower frequency bandwidth than the low-speed channels.

4. The method of claim 1 wherein, in the electrical high-speed channel, the control channel is located at a frequency lower than that of the electrical low-speed channels.

1 5. The method of claim 1 wherein the control channel has a data rate of approximately 2
2 Mbps.

1 6. The method of claim 1 wherein the overhead information includes software to be loaded
2 onto the second node.

1 7. The method of claim 1 wherein the overhead information includes information for
2 controlling the second node.

- 1 8. The method of claim 1 wherein the overhead information includes information for
2 configuring the second node.
- 1 9. The method of claim 1 wherein the overhead information includes diagnostic information
2 from testing one of the nodes.
- 1 10. The method of claim 1 wherein the overhead information includes metrics from
2 measuring a performance of a fiber link between the first node and the second node.
- 1 11. The method of claim 1 wherein the overhead information includes information used for
2 fault isolation.
- 1 12. The method of claim 1 wherein the overhead information includes information used to
2 establish a fiber link between the first node and the second node.
- 1 13. The method of claim 1 further comprising:
2 receiving the optical high-speed channel;
3 converting the optical high-speed channel from optical to electrical form to recover the
4 electrical high-speed channel; and
5 frequency division demultiplexing the control channel from the electrical high-speed
6 channel.
- 1 14. The method of claim 1 further comprising:
2 generating a second control channel containing second overhead information;
3 frequency division multiplexing the second control channel with a second plurality of
4 electrical low-speed channels to form a second electrical high-speed channel;
5 converting the second electrical high-speed channel from electrical to optical form to
6 form a second optical high-speed channel; and
7 transmitting the second optical high-speed channel over a second optical fiber from the
8 second node to the first node.

- 1 15. An optical fiber communications system for transmitting at least two low-speed channels
2 across the communications system, the communications system comprising:
3 a first node including:
4 an FDM multiplexer for combining a control channel with the low-speed channels
5 into an electrical high-speed channel; and
6 an E/O converter coupled to the FDM multiplexer for converting the electrical
7 high-speed channel from electrical to optical form to form an optical high-
8 speed channel.
- 1 16. The communications system of claim 14 wherein, within the optical high-speed channel,
2 the control channel is more robust than the low-speed channels to impairments in the optical
3 fiber.
- 1 17. The communications system of claim 14 wherein the control channel has a narrower
2 frequency bandwidth than the low-speed channels.
- 1 18. The communications system of claim 14 wherein, in the electrical high-speed channel,
2 the control channel is located at a frequency lower than that of the electrical low-speed channels.
- 1 19. The communications system of claim 14 further comprising:
2 a second node coupled to the first node by an optical fiber, the second node including:
3 an O/E converter for converting the optical high-speed channel to the electrical
4 high-speed channel; and
5 a FDM demultiplexer coupled to the O/E converter for frequency division
6 demultiplexing the control channel from the electrical high-speed channel.
- 1 20. The communications system of claim 19 wherein:
2 the second node further comprises:

3 an FDM multiplexer for combining a second control channel with second low-
4 speed channels into a second electrical high-speed channel; and

5 an E/O converter coupled to the FDM multiplexer for converting the second
electrical high-speed channel from electrical to optical form to form a
second optical high-speed channel; and

the first node further comprises:

9 an O/E converter for converting the second optical high-speed channel to the
10 second electrical high-speed channel; and

11 a FDM demultiplexer coupled to the O/E converter for frequency division
12 demultiplexing the second control channel from the second electrical high-
speed channel.